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EXAMINER	
THOMAS, MIA M	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/519,032	ANOUAR ET AL.	
	Examiner	Art Unit	
	Mia M. Thomas	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *22 December 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 December 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *see attached*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is made responsive to applicant's remarks received on 22 December 2004. Claims 1-32 remain pending in this instant application. The claims have been amended to remove the multiple dependencies. Applicant's request that all the claims be examined in view of the amendment to the claims is hereby entered into the record.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 10-11, 19-32 are rejected under 35 U.S.C. 102(e) as being anticipated by Raterman (US 6,459,806 B1).

Regarding Claims 1 and 24: Raterman discloses a method of testing a currency item ("An improved method and apparatus for discriminating between currency bills of different denominations uses an optical sensing and correlation technique..." at abstract) comprising:

deriving a plurality of measurements of the currency item at a resolution (R) ("A series of detected reflectance signals are obtained by sampling and digitally processing, under microprocessor control, the reflected light at a plurality of predefined sample points as a currency bill is moved across an illuminated strip with its narrow dimension parallel to the direction of transport of the bill." at abstract)
and processing the measurements to derive values at a different resolution ("A plurality of master characteristic patterns are generated and stored using original bills for each denomination of currency to be defected." at abstract).

Regarding Claim 10: Raterman discloses wherein measurements are derived at a first resolution R1 in a first spatial direction and at a second resolution R2 in a second spatial direction ("The stored patterns correspond, respectively, to optical scans performed on the green surface of a bill along "forward" and "reverse" directions relative to the pattern printed on the bill. For bills which produce significant pattern changes when shifted slightly to the left or right such as the $." at 3, line 19).

Regarding Claim 11: Raterman discloses wherein the first and second directions are substantially perpendicular ("In effect, the optical sensors S1 and S2 are disposed opposite each other along a line within the scan head area which is perpendicular to the direction of bill flow." at column 27, line 60).

Regarding Claim 19: Raterman discloses wherein the measured values are derived along a line substantially parallel to one edge of the document ("FIGS. 1A-1C illustrate the scanning process in more detail. As a bill is advanced in a direction parallel to the narrow edges of the

bill, scanning via the wide slit in the scanhead is effected along a segment S of the central portion of the bill. As the bill traverses the scan head, a strip s of the segment S is always illuminated, and the photodetector produces a continuous output signal which is proportional to the intensity of the light reflected from the illuminated strip s at any given instant. This output is sampled at intervals controlled by the encoder, so that the sampling intervals are precisely synchronized with the movement of the bill across the scanhead." at column 7, line 48).

Regarding Claims 20-23, 28-30: Raterman discloses a method and currency tester for validating a currency item, denominating a currency item, testing a document, banknote or other value sheet, testing a coin ("The present invention relates, in general, to currency identification. The invention relates more particularly to a method and apparatus for automatic discrimination and counting of currency bills of different denominations using light reflectivity characteristics of indices printed upon the currency bills." at column 1, line 24).

Regarding Claim 24: Raterman discloses a currency tester adapted to perform a method as claimed in claim 1 (Refer to Figure 11; "FIG. 11 is a perspective view showing currency discrimination and counting apparatus particularly adapted to and embodying the optical sensing and correlation technique of this invention." at column 5,line 1).

Regarding Claim 25: Raterman discloses means for sensing a currency item at resolution R ("FIG. 16 is an exploded top perspective view of the optical scan-head used in the system of FIGS. 1-15." at column 5, line 16).

Regarding Claims 26 and 27: Raterman discloses means for sensing a currency item at resolution R1 extending in a first direction and means for sensing a currency item at a resolution R2 in a second direction (Specifically Refer to Figure 20; "As best illustrated in FIG. 20, the pair of optical sensors S1 and S2 (having corresponding light sources and photo detectors which are not shown here) are co-linearly disposed within the scan head area in close parallelism with the wide dimension edges of incoming test bills." at column 27, line 55).

Regarding Claim 31: Raterman discloses wherein a document can be fed in the transport path with skew and offset with respect to the edge of the transport path ("Accordingly, currency bills are firmly gripped under uniform pressure between the two sets of active and passive rollers within the scanhead area, thereby minimizing the possibility of bill skew and enhancing the reliability of the overall scanning and recognition process." at column 23, line 39).

Regarding Claim 32: Raterman discloses a currency tester as claimed in claim 24 which can process a plurality of currency items of different sizes ("Preferably, the currency discrimination and counting method and apparatus of this invention is adapted to identify seven (7) different denominations of U.S. currency, i.e., $1, $2, $5, $10, $20, $50 and $100. Accordingly, a master set of 16 different characteristic patterns is stored within the system memory for subsequent correlation purposes (four patterns for the $10 bill and two patterns for each of the other denominations." at column 3, line 29).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 2-7, 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raterman (US 6,459,806 B1) in combination with Wolberg---"Image Resampling"-IEEE Computer Society Press, pages 117-149.

Regarding Claim 2:

Raterman discloses all the claimed elements as listed above at Claim 1.

Raterman does not specifically disclose the reduction of the resolution in the spectral domain comprising filtering the signal to reduce the resolution by talking a subset of the spectral components, however,

Wolberg teaches wherein the resolution is reduced in the spectral domain, the method comprising filtering the signal of the measured values in the spectral domain to reduce the resolution in the spectral domain by taking a subset of the set of spectral components (Refer to Figure 5.2: Image Magnification and Minification; "In the top half of the figure, the interval between the adjacent black and white pixels must be reconstructed in order to generate five output points. A ramp is fitted between these points and uniformly sampled at five locations to yield the intensity gradation appearing at the output. Figure 5.1 demonstrates the reduction of the image to the spectral domain. The Figures of 5.3-"Ideal Sampling" demonstrate the

convolution of the resolution with a reconstruction filter r (u)." at pages 118, paragraph 2, approximately at line 9).

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to reduce the resolution in the spectral domain by taking a subset of the set of spectral components as taught by Wolberg with the derivation of the measurements at a resolution as disclosed by Raterman because "Recall that an ideal reconstruction filter will have unity gain in the pass band and zero gain in the stop band in order to transmit and suppress the signal's spectrum in these respective frequency ranges." (Wolberg-at page 125, paragraph 3).

Regarding Claim 3:

Wolberg teaches wherein the subset is of a predetermined size ("Note that the resampling grid is the result of projecting the output grid onto the input through a spatial transformation. After the reconstructed signal is sampled by the resampling grid, the samples (circles) are assigned to the uniformly spaced output image." at page 117, paragraph 4, second to the last sentence from the bottom of the page.).

Regarding Claim 4:

Wolberg teaches wherein the spectral domain is the frequency spectrum ("In the special case of magnification, we may ignore the prefilter all together, treating it instead as an impulse function. This is due to the fact that no high frequencies are introduced into the output upon magnification. Conversely, minification introduces high frequencies and does not require any reconstruction of the input image." Further, reference equations 5.27(a) and 5.27(b). at page 122, paragraph 2. For clarity as best understood by the Examiner, Image magnification and minification are typical instance of image resampling...For instance, stretching, zooming, scaling

up, interpolation, and up sampling are all informal terms used to describe magnification. Similarly, minification, compression, shrinking, scale reduction, decimation and down sampling are all terms that describe the process or reducing the size of an image." at page 118 (Wolberg)).

Regarding Claim 5:

Wolberg teaches wherein the filtering excludes high frequency components (Conversely, minification introduces high frequencies and does not require any reconstruction of the input image. Consequently, we can ignore the reconstruction filter and treat it simply as an impulse function." at page 122, paragraph 2).

Regarding Claim 6:

Wolberg teaches wherein the signal of the measured values is normalized, preferably by a mean value, before filtering ("Since larger neighborhoods are used to compute each output pixel, the normalized weights applied to the input decrease to reflect the diminishing impact of each input sample. As a result, the prefilter grows shorter." at page 122, paragraph 3, last sentence of the page.).

Regarding Claim 7:

Wolberg teaches deriving a feature vector using the subset of spectral components (Refer to Equations 5.2.1-5.2.5, where the Examiner is referring to the fact that (dm/du), is the determinant of the Jacobian matrix interrelating the input and the output coordinate systems." at page 121).

Regarding Claim 14: Wolberg teaches summing measured values weighted by a weighting function ("The spectra for the Hann and Hamming windows can be shown to be the sum of a sinc, the spectrum of Rect(x), with two shifted counterparts: a sinc shifted to the right by 2pi/ (n-1), as well as one shifted to the left by the same amount." at page 139, Section 5.4.6.1, paragraph 2).

Regarding Claim 15: Wolberg teaches wherein the weighting function is of the form sin(x)/x (Refer to Equation 5.4.25, at page 139).

Regarding Claim 16: Wolberg teaches including using a weighting window to compensate for edge effects ("The Hann and Hamming windows are defined as (Refer to Equation 5.4.25)." at page 139).

Regarding Claim 17: Wolberg teaches wherein the weighting window is a raised cosine window such as a Hamming or Hanning or Kaiser-Bessel window ("Since they both amount to a scaled and shifted cosine function, they are also known as the raised cosine window." at page 139, subsection 5.4.6.1-Hann and Hamming Windows, paragraph 1).

7. **Claim 8** is rejected under 35 U.S.C. 103(a) as being unpatentable over Raterman (US 6,459,806 B1) in combination with Wolberg---"Image Resampling"-IEEE Computer Society Press, pages 117-149 as applied to claims 1-7 above, and further in view of Imagawa et al. (US 5,479,570).

Regarding Claim 8:

Raterman discloses the claimed elements of claim 1 as reference above.

Wolberg teaches all of the claimed elements of claims 2-7 as listed above.

Wolberg in combination with Raterman does not specifically disclose processing the feature vector using a neural network, including a back propagation network or an LVQ network, However,

Imagawa teaches processing the feature vector using a neural network, including a back propagation network or an LVQ network (Refer to Figure 6; "The weight factor updating section 1b updates the category reference pattern signal (weight factor) of the in-group similarity calculating section 1a from the output of the in-group similarity calculating section 1a and that of the learning control signal loading section 6 by using a method for example similar to a learning algorithm called Learning Vector Quantization (LVQ)." at column 10, line 17).

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to combine the method of reducing the resolution of the filter[ed] signal to the spectral domain in the method of testing currency items as disclosed by the combination of Wolberg and Raterman and process the feature vectors using a neural network such as an LVQ network because "A degree of similarity to each category in the category group of the input pattern signal is found by connecting the plurality of multi-input-output signal processing sections in a network so as to have a layer structure, to have no connection mutually within each layer and to propagate signals only to the upper layers." (Imagawa-at column 1, line 47).

8. Claims 9, 13, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raterman (US 6,459,806 B1) in combination with Wolberg---"Image Resampling"-IEEE Computer Society Press, pages 117-149 as applied to claims 1-7 above, and further in view of Dodgson---"Quadratic Interpolation for Image Resampling", IEEE Transactions on Image Processing, Vol 6, No. 9, September 1999, pages 1322-1326.

Regarding Claim 9:

Raterman in combination with Wolberg and further in view of Imagawa discloses all the claimed elements as listed above.

Raterman in combination with Wolberg and Imagawa does not specifically disclose interpolation to increase the resolution in the spatial domain. However,

Dodgson teaches interpolation to increase the resolution in the spatial domain (For example, "Linear interpolation has poor pass band performance with the quadratic and cubic approximating B-Splines getting progressively worse, as could be expected from their progressively greater blurring effects." at page 3, Section V. Evaluation, subsection C, paragraph 2-Refer to Figures 5 and 6 for more detail).

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to increase the resolution in the spatial domain as taught by Dodgson with the measurements of the currency item at a resolution, in the spectral domain as disclosed by the combination of Raterman and Wolberg because in the "frequency domain, the analysis allows for the comparison of the reconstructor against the sinc function, which is the perfect reconstructor for band-limited signals.[18][19]." at page 3, subsection 3 (Dodgson)).

Regarding Claim 13: Dodgson teaches a method of reconstituting (reconstructing) a sampled signal ("A frequency domain analysis compares the reconstructor against the sinc function, the perfect reconstructor for band-limited signals [18],[19]." at page 1325, Subsection C, paragraph 1).

Regarding Claim 18: Dodgson teaches removing the mean of the measured values before interpolation and reinstating it after interpolation ("The interpolating quadratic (Equation 4) produces a piecewise reconstruction where each parabolic piece is constrained to pass through a data point and the two adjacent midpoints." At page 3, Section V, subsection A, paragraph 2 Further, Refer to Figure 3).

9. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Raterman (US 6,459,806 B1).

Regarding Claim 12:

Raterman does not specifically disclose the increase in the resolution resulting in the spatial domain however,

Raterman does disclose wherein R1<; R2, and wherein the processing increases the resolution in the first direction to approximately R2 ("In accordance with a feature of this invention, the machine-direction dimension of the illuminated strip of light produced by the light sources within the scanhead is set to be relatively small for the initial stage of the scan when the thin borderline is being detected. The use of the narrow slit increases the sensitivity with which the reflected light is detected and allows minute variations in the "gray" level reflected off the bill surface to be sensed." at column 9, line 11).

At the time that the invention was made, it would have been obvious to interpret that when making reference to an optical scanhead that Raterman is in fact referring to a resolution or measurement that is in the first direction ("forward") and also in a second direction ("backward"). It would have been obvious to obtain the same measurements in a spatial or spectral domain using an optical scan head.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mia M. Thomas whose telephone number is 571-270-1583. The examiner can normally be reached on Monday-Friday 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on 571-272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Mia M Thomas
Examiner
Art Unit 2624

Mia M. Thomas

VIKKRAM BALI
PRIMARY EXAMINER